

AD-A136 038

GEORGE AIR FORCE BASE AIR EMISSION INVENTORY(U) AIR  
FORCE OCCUPATIONAL AND ENVIRONMENTAL HEALTH LAB BROOKS  
AFB TX E W ARTIGLIA SEP 83 OEHL-83-261EQ073JEB

1/1

UNCLASSIFIED

F/G 13/2

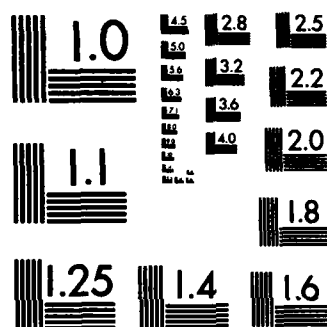
NL

END

**FILED**

1-04

DTAC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

2

USAF OEHL REPORT  
83-261EQ073JEB



AD A136 038

GEORGE AIR FORCE BASE  
AIR EMISSION INVENTORY  
SEPTEMBER 1983

DTIC  
ELECTE  
DEC 20 1983  
S D  
T E

USAF Occupational and Environmental Health Laboratory  
Aerospace Medical Division (AFSC)  
Brooks Air Force Base, Texas 78235

DTIC FILE COPY

THIS REPORT IS  
FOR PUBLIC  
DISTRIBUTION

## NOTICES

When U.S. Government drawings, specifications, or other data are used for any purpose other than a definitely related Government procurement operation, the Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

The mention of trade names or commercial products in this publication is for illustration purposes and does not constitute endorsement or recommendation for use by the United States Air Force.

Do not return this copy. Retain or destroy.

Please do not request copies of this report from the USAF Occupational and Environmental Health Laboratory. Additional copies may be purchased from:

National Technical Information Service  
5285 Port Royal Road  
Springfield, Virginia 22161

Government agencies and their contractors registered with the DTIC should direct requests for copies of this report to:

Defense Technical Information Center (DTIC)  
Cameron Station  
Alexandria, Virginia 22314

This report has been reviewed by the Public Affairs Office and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

*William E. Mabson*

WILLIAM E. MABSON, Colonel, USAF, BSC  
Commander

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 83-261HQ073JEB	2. GOVT ACCESSION NO. 4D-4136	3. RECIPIENT'S CATALOG NUMBER 038
4. TITLE (and Subtitle) GEORGE AIR FORCE BASE AIR EMISSION INVENTORY		5. TYPE OF REPORT & PERIOD COVERED Final 27 Feb-4 Mar 83
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) EDWARD W. ARTIGLIA, Major, USAF, BSC		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS USAF Occupational and Environmental Health Laboratory, Brooks AFB TX 78235		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS USAF Occupational and Environmental Health Laboratory, Brooks AFB TX 78235		12. REPORT DATE September 1983
		13. NUMBER OF PAGES 84
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report)  UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Artiglia                      Air Pollution                      AQAM Emission Inventory              George AFB		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report is the air emission inventory for George AFB CA. The emission source data were used with the Air Quality Assessment Model (AQAM) to provide calculated measurements for the amount of carbon monoxide, hydrocarbon, nitrogen oxides, particulate matter and sulfur oxides emitted by all major sources at George AFB.		

Report No. 83-261EQ073JEB

USAF OCCUPATIONAL AND ENVIRONMENTAL

HEALTH LABORATORY

Brooks AFB, Texas 78235

GEORGE AIR FORCE BASE AIR EMISSION INVENTORY

GEORGE AFB CA

SEPTEMBER 1983

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

Prepared by:

*Edward W. Artiglia*  
EDWARD W. ARTIGLIA, Major, USAF, BSC  
Chief, Air Quality Function

Reviewed by:

*Dennis F. Naugle*  
DENNIS F. NAUGLE, Lt Colonel, USAF, BSC  
Chief, Environmental Quality

Approved by:

*Charles R. Jones*  
CHARLES R. JONES, Lt Colonel, USAF, BSC  
Deputy Chief, Consultant Services Division



## TABLE OF CONTENTS

	Page
Preface	ii
I. INTRODUCTION	1
II. DISCUSSION	1
III. ANALYSIS OF RESULTS	2
IV. CONCLUSION	3
Bibliography	4
Appendix	
A        Definition of Terms	5
B        Emission Inventory, George AFB	6
C        Emission Inventory Histograms, George AFB	7
List of Abbreviations and Symbols	8

## **PREFACE**

During 27 February-4 March 1983, the USAF Occupational and Environmental Health Laboratory, conducted an air emission inventory at George AFB CA. The survey team consisted of Maj Edward W. Artiglia and MSgt James L. Sablan. Local assistance was provided by Capt James D. Montgomery, USAF Hospital George/Bioenvironmental Engineer.



## **I. INTRODUCTION**

An air emission inventory was performed 27 Feb-4 Mar 83 for George AFB CA by the Air Quality Function of the USAF Occupational and Environmental Health Laboratory (USAF OEHL). The inventory was performed in response to a request from the Vice Commander of the Air Force Flight Test Center (AFTEC), Edwards AFB CA. This request asked that all Air Force operations in the vicinity of the R-2508 airspace be surveyed to determine the amount of pollutants that these operations emit into the atmosphere. This inventory is only part of the total survey which includes George AFB CA, Edwards AFB CA, AF Plant 42 at Palmdale CA and the aircraft traffic in the R-2508 airspace. The request was forwarded through the Bioenvironmental Engineer, USAF Hospital Edwards to the Chief, Bioenvironmental Engineering Division at Headquarters Air Force Systems Command (HQ AFSC/SGPB). The inventory was required for the base because of the decrease in visibility in the R-2508 airspace.

The emission source data collected were used with the Air Quality Assessment Model (AQAM) to provide the calculated measurements for the amount of carbon monoxide, hydrocarbons, nitrogen oxides, particulate matter and sulfur oxides emitted by all major sources at George AFB. There were two computer products from the AQAM that are included as Appendixes B and C in this report; the emission inventory and the emission histograms.

Definitions of the technical terms used in this report are listed in Appendix A.

## **II. DISCUSSION**

The data base for the AQAM involves an inventory of all point, line and area sources at George AFB. The input data consist of the type of emission source, the amount of fuel consumed and the number of each source. The model contains the emission rates for all Air Force aircraft and engines, ground support equipment, motorized vehicles, power plants and incinerators. There were no actual measurements taken of source emissions during the inventory.

There were 20 sources at George AFB included in this inventory (15 point sources, 5 area sources and 0 line sources). The Base Description and General Comments section of the Emission Inventory (Appendix B, page 1) lists each of these sources along with a brief description of the source.

The point sources inventoried were the: (a) fire department's training fire site; (b) engine sound suppressors and test cell; (c) run-up trim pads; (d) pathological incinerator; and (e) seven fuel storage tanks.

Area sources are used when there are a number of similar small point sources located in proximity to each other. The area sources listed in the inventory are vehicle parking lots, space heating areas and motor vehicle areas. The space heating area category consists of all the buildings located on base.

There were no line sources used in the inventory. Line sources usually consist of base roadways that are used by both military and civilian vehicles.

All of the vehicles operating at George AFB are confined to one easily definable area. The amount of emissions is the same for vehicles operating on lines or in areas.

The emission source information for aircraft operations include all aircraft activity (i.e., arrivals, departures and touch-and-go landings), location of parking areas, length of taxiway paths, length of runways and ground service vehicles. The model assumes that for every aircraft arrival, that the aircraft will go through one complete cycle. This cycle consists of landing, taxiing to a parking area, engine shutdown, servicing by ground maintenance crews, refueling, engine start-up, taxiing to end of runway and departure.

It is not required or practicable to include in this inventory all of the 30 different types of aircraft that use the George AFB flightline during a one-year period. Only the aircraft assigned to George AFB were included (i.e., F-4 and F-106), while all other aircraft were grouped in one of five categories. These categories were training, cargo, fighter, attack and transient aircraft.

### **III. ANALYSIS OF RESULTS**

The air emission inventory for George AFB is included as Appendix B. The inventory contains a description of all air pollution emission sources, a summary of the source pollutant emissions, a listing of the emissions by category (i.e., aircraft, ground mobile, facilities and evaporative hydrocarbons) and a detailed listing of information for each emission source.

The annual source emissions are listed on pages 1.1 and 1.2 of Appendix B. This table shows the total number of metric tons of pollution by type (i.e., CO, HC, NO<sub>x</sub>, PM and SO<sub>x</sub>). Also included is a percentage breakdown of which category was emitting which pollutants.

The amount of each pollutant emitted and percentage of pollutant generated by category are reasonable and within the range of what would be expected from a base with the type of operations and size of George AFB.

The following example with carbon monoxide is provided to show how to use this inventory. The summary of annual emissions states that George AFB generates slightly less than 1,500 metric tons of CO per year (Appendix B, page 1.1). The aircraft category is the largest contributor of CO (84%) (Appendix B, page 1.2). A further breakdown will show that the F-4 was the major aircraft emitter (Appendix B, page 3.1.3-1). Additional examination reveals that the ground service vehicles (listed as ARR & DEP SV, Appendix B, page 3.1.3-1) was the largest of the 15 F-4 operations for emission of carbon monoxide.

Histograms of the annual emissions are provided in Appendix C for your use. The following source categories have been graphically displayed: aircraft type, ground mobile sources, air base facilities, evaporative hydrocarbons, environs and total annual emissions. Point sources of less than 100

tons per year (1000 tons per year for CO) are not classified as "major sources" and do not usually need to be reported to the state pollution control agency. Mobile sources are exempt from the U.S. Environmental Protection Agency's "major source" classification.

#### IV. CONCLUSIONS

The emission summary (Appendix B, page 1.1-1 and 1.1-2) shows that the aircraft operations are the principal source for the pollution generated at George AFB. As expected, the F-4 aircraft is the only significant aircraft of interest. Aircraft contribute a minimum 58% of each of the pollutants, with the highest contribution being 86% of the hydrocarbons. Aircraft dominate the contribution of pollutants because there are no large point sources (e.g. central heating plant) at George AFB. For comparison purposes, the largest point source for carbon monoxide is the aircraft run-up stands which generate 33 metric tons per year. The F-4 aircraft, on the other hand, generates 1142 metric tons of CO per year.

The vehicles driven on the base are not of major concern. The only significant pollutant from vehicles is nitric oxides (30%).

The data base for this inventory is stored on the USAF OEHL computer. Future updates can easily be accomplished and furnished to the base.

## BIBLIOGRAPHY

1. Compilation of Air Pollutant Emission Factors (AP-42), 3rd Ed., Research Triangle Park NC: U.S. Environmental Protection Agency, 1981.
2. Delaney, Bernard T. Air Quality Assessment Model (AQAM) Field Data Collection Guide (AFWL-TR-75-220). Kirtland AFB NM: Air Force Weapons Laboratory, 1975.
3. Eberle, G.F. and M.D. Steer. Air Quality Procedures for Civilian Airports and Air Force Bases (FAA-EE-82-21). Washington DC: Federal Aviation Administration, 1982.
4. Menicucci, David F. Air Quality Assessment Model (AQAM) Data Reduction and Operation Guide (AFWL-TR-75-307). Kirtland AFB NM: Air Force Weapons Laboratory, 1976.
5. Rote, Donald M. and Lawrence E. Wanger. A Generalized Air Quality Assessment Model for Air Force Operations (AFWL-TR-74-304). Kirtland AFB NM: Air Force Weapons Laboratory, 1975.
6. Scott, Harold A., Jr and Dennis F. Naugle. Aircraft Air Pollution Emissions Estimation Techniques - ACKE (CEKDO-TR-78-33). Tyndall AFB FL: Civil and Environmental Engineering Development Office, 1978.
7. Wark, Kenneth and Cecil F. Warner. Air Pollution: Its Origin and Control. New York: Harper & Row, Publishers, 1981.

## **APPENDIX A**

### **Definition of Terms**

## **DEFINITION OF TERMS**

### **Air Pollutants**

Air pollutants are contaminants in the atmosphere. The presence in the outdoor atmosphere of one or more contaminants or combinations thereof, in such quantities and of such duration as may be or may tend to be injurious to human, plant, or animal life, or property, or which unreasonably interferes with the comfortable enjoyment of life or property or the conduct of business.

### **Carbon Monoxide**

Carbon monoxide (CO) is a colorless and odorless gas. It is very stable and has a lifetime of two to four months in the atmosphere. CO is the most widely distributed and most commonly occurring air pollutant. The total emissions of CO to the atmosphere exceed those of all other air pollutants combined. The national emissions of carbon monoxide are roughly 85.4 million metric tons per year in 1980, of which approximately 90 percent is from man-made sources. The largest single source of CO pollutant emissions is highway vehicles (61.9 million metric ton/year in 1980).

### **Hydrocarbons**

Hydrocarbon (HC) pollutants originate primarily from the incomplete combustion of fuels, particularly the more volatile fuels such as gasoline, and from the use of hydrocarbons as process raw materials such as solvents. The major man-made sources are gasoline-powered vehicles, but also include other types of vehicles such as aircraft. Man-made stationary sources which emit hydrocarbons primarily, include petroleum and petrochemical operations and solvent usage, with some contribution from waste burning. Hydrocarbons are not, by themselves, generally considered a health hazard; rather, it is their reaction with other pollutants and sunlight which produces photochemical smog. This condition reduces visibility and can cause eye irritation and an aggravation of respiratory problems.

### **Sulfur Dioxide**

Sulfur dioxide (SO<sub>2</sub>) is the dominant oxide of sulfur present in the atmosphere. SO<sub>2</sub> is a nonflammable, nonexplosive, colorless gas. It can act as either a reducing agent or as an oxidizing agent, and it can react with materials in the air to form sulfur trioxide, sulfurous acid, and sulfate salts. Sulfur trioxide (SO<sub>3</sub>) reacts very rapidly with water vapors to produce sulfuric acid (H<sub>2</sub>SO<sub>4</sub>). Sulfur dioxide is generated during the combustion of any sulfur-bearing raw materials. Combustion of fuels account for over 90 percent of all SO<sub>2</sub> emitted. This is due to the

relatively high sulfur content of some bituminous coals and residual fuel oils, and to the very large amounts of these fuels consumed in this country and around the world as a source of power.

#### Oxides of Nitrogen

Of the various oxides of nitrogen ( $\text{NO}_x$ ), only nitric oxide ( $\text{NO}$ ) and nitrogen dioxide ( $\text{NO}_2$ ) are considered important air pollutants.  $\text{NO}$  is formed when combustion takes place at a high enough temperature to cause a reaction between the nitrogen and oxygen in the air. Temperatures this high are reached only in efficient combustion processes or when combustion takes place at high pressure. These conditions are primarily found in automobile, or aircraft engine cylinders, electric power plants, and other very large energy-conversion processes. Nitric oxide, which is relatively harmless, is the form generally emitted into the atmosphere. It will, at varying times, oxidize to  $\text{NO}_2$ , which is a considerably more toxic gas. This oxidation process is a product or by-product of a number of industries including fertilizer and explosives manufacturing.

#### Particulate Matter

Particulate matter (PM) or total suspended particulates (TSP) are defined as any material (except uncombined water) that exists as a solid or liquid in the atmosphere or in a gas stream under standard conditions of temperature and pressure. Particles discharged into the atmosphere may be in the form of fly ash, soot, dust, fog, or fumes. Small particles are produced by condensation and combustion. Larger ones result from mechanical processes such as grinding, spraying and pulverization by vehicles and pedestrians. Natural sources include ocean salt, volcanic ash, wind erosion, forest fire smoke and ash, and plant and seed pollen.

**APPENDIX B**

**Emission Inventory, George AFB**



## **TABLE OF CONTENTS**

### **INTRODUCTION**

#### **Base Description and General Comments**

#### **1. Source Emissions Summary**

- 1.1. Annual Emissions in M-Tons**
- 1.2. Annual Emissions in Percentage**

#### **2. Emissions by Category**

- 2.1. Aircraft**
- 2.2. Airbase Ground Mobile**
- 2.3. Airbase Facilities**
- 2.4. Airbase Evaporative Hydrocarbons**
- 2.5. Environ (Off Airbase) Emissions**

#### **3. Emission Source Information**

##### **3.1. Aircraft**

- 3.1.1. Information on Aircraft Activity, Parking Areas, Taxiways and Runways**
- 3.1.2. Information for Aircraft Service Vehicles**
- 3.1.3. Summary of Annual Emissions by Aircraft Type**

##### **3.2. Airbase Ground Mobile**

- 3.2.1. Vehicle Age Distribution**
- 3.2.2. Military Vehicle Area Sources**
- 3.2.3. Civilian Vehicle Area Sources**
- 3.2.4. Military Vehicle Line Sources**
- 3.2.5. Civilian Vehicle Line Sources**

##### **3.3. Airbase Facilities**

- 3.3.1. Training Fires**
- 3.3.2. Test Cells**
- 3.3.3. Runup Stands**
- 3.3.4. Power Plants**
- 3.3.5. Incinerators**
- 3.3.6. Other Point Sources**
- 3.3.7. Space Heating Area Sources**
- 3.3.8. Airbase Non-Aircraft Line Sources**

##### **3.4. Airbase Evaporative Hydrocarbons**

- 3.4.1. Storage Tanks — Points**
- 3.4.2. Storage Tanks — Areas**

- 3.4.3. Fuel Transfer and Filling Areas
- 3.4.4. Tank Truck Parking Areas
- 3.4.5. Vehicle Parking Areas
- 3.4.6. Other Evaporative Area Sources

3.5. Environ (Off Airbase) Emissions

- 3.5.1. Point Source
- 3.5.2. Environ Stationary Areas
- 3.5.3. Environ Mobile Areas
- 3.5.4. Environ Roadway Lines
- 3.5.5. Environ Non-Roadway Lines

3.6. Meteorological Data Summary

## **I N T R O D U C T I O N**

THE US AIR FORCE HAS DEVELOPED AN AIR QUALITY ASSESSMENT MODEL (AQAM) WHICH CONSISTS OF FOUR COMPUTER CODES:

- A SOURCE INVENTORY PROGRAM TO COMPUTE TOTAL EMISSIONS FROM OPERATIONAL INPUT DATA;
- A SHORT TERM DISPERSION PROGRAM TO PREDICT CONCENTRATIONS ON A ONE-HOUR BASIS;
- A LONG TERM PROGRAM TO PREDICT CONCENTRATIONS ON AN ANNUAL BASIS;
- A METEOROLOGICAL PROGRAM TO COMPILE THE CLIMATOLOGY FOR USE IN THE LONG TERM PREDICTIONS.

DETAILED DISCUSSIONS OF THE AQAM THEORY AND APPLICATIONS ARE PRESENTED IN AFWL-TR-74-304, AFWL-TR-75-220, AND AFWL-TR-75-307.

THE SOURCE INVENTORY PROGRAM INPUT DATA INCLUDES AIRCRAFT ENGINE EMISSION FACTORS, LANDING AND TAKEOFF (LTO) CYCLE INFORMATION, RUNWAY, TAXIWAY, AND PARKING MAMP COORDINATES, LTO ACTIVITY BY AIRCRAFT TYPE, AND EMISSION INFORMATION FOR MANY NON-AIRCRAFT EMISSION SOURCES. AIRCRAFT ENGINE EMISSION INFORMATION WAS COMPILED FROM MEASUREMENTS TAKEN BY THE AIR FORCE, NAVY OTHER GOVERNMENT AGENCIES, AND INDUSTRY.

THE LTO CYCLE INFORMATION WAS OBTAINED FROM FIELD OBSERVATION AT FIVE LOCATIONS AND PILOT SURVEYS AT SIX LOCATIONS.

NONAIRCRAFT EMISSION SOURCES ARE COMPUTED BY UTILIZING A DATA BANK OF EMISSION FACTORS WHICH HAS BEEN PROGRAMMED INTO THE AQAM. THESE VALUES ARE CONSISTENT WITH THE EPA PUBLICATION AP-42. OPERATIONAL INFORMATION MUST BE INPUT SPECIFICALLY FOR EACH AIRBASE ANALYZED.

BASE DESCRIPTION AND GENERAL COMMENTS

BENCHMARK (DESCRIPTION)	LOCATION OF GRID ORIGIN			UTM NORTHING (KILOMETERS)	UTM EASTING (KILOMETERS)
	LATITUDE (DEG/MIN/SEC)	LONGITUDE (DEG/MIN/SEC)			
CENTER SOUTH END OF RUNWAY 34-16	34 34 59.000	117 23 4.000		464.700	3826.700

# LIST OF AIRBASE SOURCES

SOURCE ID	FACILITY NUMBER	DESCRIPTION
2001		TRAINING FIRE SITE
2101	BLDG 832	SOUND SUPPRESSORS (832 & 833)
2102	BLDG 568	ENGINE SOUND SUPPRESSOR
2201	BLDG 802	TEST CELL UNIVERSAL SEMI-PORTABLE
2202	FAC 827	TRIM PAD
2203	FAC 828	TRIM PAD
2204	FAC 837	TRIM PAD
2401	BLDG1155	HOSPITAL PATHOLOGICAL INCINERATOR
2501	FAC 547	JP-4 BULK FUEL STORAGE TANK
2502	FAC 548	JP-4 BULK FUEL STORAGE TANK
2503	FAC 554	JP-4 BULK FUEL STORAGE TANK
2504	FAC 556	JP-4 BULK FUEL STORAGE TANK
2505	FAC 557	JP-4 BULK FUEL STORAGE TANK
2506	BLDG 550	MOTOR POOL MOGAS FUEL STORAGE TANKS
2507	BLDG 12	BASE SERVICE STATION FUEL STORAGE TANKS
3201	BLDG 552	POL TANK TRUCK PARKING AREA
3301		VEHICLE PARKING GEORGE AFB
3501		SPACE HEATING AREA SOURCE GORGE AFB
3701		MILITARY MOTOR VEHICLE AREA SOURCE
3801		CIVILIAN MOTOR VEHICLE AREA SOURCE

SECTION 1

SOURCE EMISSIONS SUMMARY

# 1.1. ANNUAL EMISSIONS IN M - T U N E

## ALL POLLUTANTS IN METRIC TONS

OPERATION	CO	HC	NOX	PM	SOX
AIRCRAFT	1.2506E+03	2.6720E+02	2.1570E+02	2.4200E+01	4.0192E+01
GROUND MOBIL	1.7112E+02	2.2430E+01	1.1416E+02	6.6323E+00	4.4190E+00
FACILITIES	6.5693E+01	1.8329E+01	4.0647E+01	6.6830E+00	3.8743E+00
ENVIRONS	0.0	0.0	0.0	0.0	0.0
	-----	-----	-----	-----	-----
GRAND TOTAL	1.4875E+03	4.2017E+02	3.7050E+02	3.7524E+01	4.8486E+01

# 1.2. ANNUAL EMISSIONS IN PERCENTAGE

OPERATION	CO	HC	NOX	PM	SOX
AIRCRAFT	84.079	86.625	58.218	64.513	82.895
GROUND MOBIL	11.504	7.434	30.812	17.675	9.114
FACILITIES	4.416	5.941	10.971	17.812	7.991
ENVIRONS	0.0	0.0	0.0	0.0	0.0



SECTION 2

EMISSIONS BY CATEGORY

# 2.1. A I R C R A F T

## ALL POLLUTANTS IN METRIC TONS

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	1.1053E+02	3.2467E+01	6.6038E+00	5.7012E-01	2.5159E+00
TAXI OUT	1.1888E+02	3.0447E+01	7.3284E+00	6.2169E-01	2.7511E+00
ENGINE CHECK	5.2651E+00	4.2459E-02	4.2160E+01	6.1796E+00	2.8845E+00
RUNWAY HOLD	1.8226E+01	5.7848E-02	1.4035E+01	6.7970E-01	4.4612E+00
CLIMB 1	2.0202E+01	6.8455E-02	1.5753E+01	7.6465E-01	4.9755E+00
CLIMB 2	2.1713E+00	1.8549E-02	1.5840E+01	2.3178E+00	1.0851E+00
APPROACH 1	6.4290E+01	1.4305E+01	1.2752E+01	1.9725E+00	2.3488E+00
APPROACH 2	1.7752E+01	4.3111E+00	2.9414E+00	4.3532E-01	5.9384E-01
LANDING	1.6188E+01	4.5401E+00	9.7643E-01	8.3200E-02	3.6753E-01
TAXI IN	7.4947E+01	2.5414E+01	4.1145E+00	3.5181E-01	1.5704E+00
SHUTDOWN	8.9808E+00	3.6145E+00	4.6178E-01	3.9655E-02	1.7871E-01
ARR + DEP SV	6.5831E+02	2.7181E+01	3.0636E+01	3.2284E+00	4.0394E+00
FUEL VENTING	0.0	5.1956E+01	0.0	0.0	0.0
FILL + SPILL	0.0	4.9849E+01	0.0	0.0	0.0
TOUCH + GO	1.3490E+02	2.3008E+01	6.2014E+01	6.9638E+00	1.2420E+01
	-----	-----	-----	-----	-----
TOTAL	1.2506E+03	2.6728E+02	2.1570E+02	2.4208E+01	4.0192E+01

# 2.2. AIRBASE GROUND MOBILE

## ALL POLLUTANTS IN METRIC TONS

OPERATION	CO	HC	NOX	PM	SOX
OFF ROAD VEH	0.0	0.0	0.0	0.0	0.0
MILITARY VEH	1.4365E+02	1.9578E+01	1.0685E+02	4.4030E+00	3.6033E+00
CIVILIAN VEH	2.7473E+01	3.3600E+00	7.3061E+00	2.2293E+00	8.1520E-01
MIL VEH LINE	0.0	0.0	0.0	0.0	0.0
CIV VEH LINE	0.0	0.0	0.0	0.0	0.0
OTHER AB LMS	0.0	0.0	0.0	0.0	0.0
TOTAL	1.7112E+02	2.2938E+01	1.1416E+02	6.6323E+00	4.4190E+00

# 2.3. AIRBASE FACILITIES

## ALL POLLUTANTS IN METRIC TONS

OPERATION	CO	HC	NOX	PM	SOX
TRAIN FIRES	1.3763E+01	7.8646E+00	1.0199E-01	3.1458E+00	2.4677E-02
TEST CELLS	1.4986E+01	2.0819E+00	1.3011E+01	1.5462E+00	2.0330E+00
RUN-UP STDS	3.3608E+01	7.0721E+00	1.4429E+01	1.9857E+00	1.8167E+00
POWER PLANTS	0.0	0.0	0.0	0.0	0.0
INCINERATORS	0.0	0.0	1.7700E-03	5.9000E-03	0.0
OTHER AB PTS	0.0	0.0	0.0	0.0	0.0
SPACE HEATING	3.2758E+00	1.3103E+01	1.3103E+01	1.6379E-04	9.8275E-06
	-----	-----	-----	-----	-----
TOTAL	6.5693E+01	1.8329E+01	4.0647E+01	6.6838E+00	3.8743E+00

H

# 2.4. AIRBASE EVAPORATIVE HYDROCARBONS

OPERATION	ALL LOSSES IN METRIC TONS				
	WORKING LOSS	FIXED ROOF BREATHING LCSS	FLOATING ROOF BREATHING LOSS	SPILLAGE	OTHER
STORAGE TANKS	3.8632E+01	0.0	2.7198E+00		
FILLING	0.0			0.0	
PET STOR TKS		0.0	0.0		
TNK TRUCK PK		0.0			
VEH PARKING		7.0266E+01			
OTHERS					0.0

TOTAL EMISSIONS FROM EVAPORATIVE HYDROCARBONS ARE 1.1162E+02 METRIC TONS

# 2.5. ENVIRON (OFF AIRBASE) EMISSIONS

## ALL POLLUTANTS IN METRIC TONS

OPERATION	CO	HC	NOX	PM	SOX
ENVIRON PTS.	0.0	0.0	0.0	0.0	0.0
ENV STA AREA	0.0	0.0	0.0	0.0	0.0
ENV MOB AREA	0.0	0.0	0.0	0.0	0.0
ENV LAND USE	0.0	0.0	0.0	0.0	0.0
ENV COM AREA	0.0	0.0	0.0	0.0	0.0
ENV ROAD WAY	0.0	0.0	0.0	0.0	0.0
ENV NON-ROAD	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0

SECTION 3

EMISSION SOURCE INFORMATION

### 3.1. AIRCRAFT

#### 3.1.1. INFORMATION ON AIRCRAFT ACTIVITY, PARKING AREAS, TAXIWAYS AND RUNWAYS

##### AIRCRAFT ACTIVITY

AIRCRAFT NAME	NUMBER OF AIRCRAFT TYPES = 7		T/G CYCLES
	ARRIVALS	(ANNUAL NUMBER OF) DEPARTURES	
F 4 E	22595.	22595.	20240.
F 106	825.	825.	825.
T 38	475.	475.	475.
C 141A	175.	175.	1.
F 15	120.	120.	120.
A 7	85.	85.	85.
TRANSENT	145.	145.	145.

##### PARKING AREAS

NUMBER OF PARKING AREAS = 4

PARKING AREA NUMBER = 1		THE NUMBER OF SQUARES MAKING UP THIS AREA = 3	
SQUARE NUMBER = 1	X = 456.280	Y = 3826.960	LENGTH OF SIDE = 0.182 KM
SQUARE NUMBER = 2	X = 465.410	Y = 3827.100	LENGTH OF SIDE = 0.182 KM
SQUARE NUMBER = 3	X = 465.540	Y = 3827.230	LENGTH OF SIDE = 0.182 KM

PARKING AREA NUMBER = 2		THE NUMBER OF SQUARES MAKING UP THIS AREA = 3	
SQUARE NUMBER = 1	X = 465.730	Y = 3827.420	LENGTH OF SIDE = 0.182 KM
SQUARE NUMBER = 2	X = 465.860	Y = 3827.560	LENGTH OF SIDE = 0.182 KM
SQUARE NUMBER = 3	X = 465.980	Y = 3827.690	LENGTH OF SIDE = 0.182 KM

PARKING AREA NUMBER = 3		THE NUMBER OF SQUARES MAKING UP THIS AREA = 1	
SQUARE NUMBER = 1	X = 466.240	Y = 3827.720	LENGTH OF SIDE = 0.182 KM

PARKING AREA NUMBER = 4		THE NUMBER OF SQUARES MAKING UP THIS AREA = 1	
SQUARE NUMBER = 1	X = 466.790	Y = 3828.550	LENGTH OF SIDE = 0.091 KM



# TAXIWAYS

NUMBER OF CATALOGUED AIRCRAFT TAXIWAY LINE SEGMENTS = 16

LINE NO.	GROUND LEVEL COORDINATES OF ONE END OF LINE X(1)	Y(1)	AVERAGE EMISSION HEIGHT (METERS) X(1)	Y(1)	WIDTH OF LINE (MET)	DELTA Z (METERS)	GROUND LEVEL COORDINATES AT OPPOSITE END OF LINE X(2)	Y(2)	AVERAGE EMISSION HEIGHT (METERS) X(2)	Y(2)	SEGMENT LENGTH (KM)
1	464.700	3826.710	3.00		20.00	8.00	464.850	3827.840	3.00		1.140
2	464.850	3826.710	3.00		20.00	8.00	465.320	3827.190	3.00		0.672
3	465.320	3827.190	3.00		20.00	8.00	465.410	3827.100	3.00		0.127
4	465.320	3827.190	3.00		20.00	8.00	465.530	3827.410	3.00		0.304
5	465.530	3827.410	3.00		20.00	8.00	464.920	3828.020	3.00		0.863
6	464.920	3828.020	3.00		20.00	8.00	464.910	3829.740	3.00		1.720
7	464.910	3829.740	3.00		20.00	8.00	464.690	3829.740	3.00		0.220
8	465.530	3827.410	3.00		20.00	8.00	465.760	3827.600	3.00		0.298
9	465.760	3827.600	3.00		20.00	8.00	465.860	3827.590	3.00		0.101
10	465.760	3827.600	3.00		20.00	8.00	465.950	3827.850	3.00		0.314
11	465.950	3827.850	3.00		20.00	8.00	466.240	3827.850	3.00		0.290
12	466.240	3827.850	3.00		20.00	8.00	466.240	3827.740	3.00		0.110
13	466.240	3827.850	3.00		20.00	8.00	463.370	3827.850	3.00		2.870
14	466.350	3827.850	3.00		20.00	8.00	466.530	3828.580	3.00		0.752
15	466.530	3828.580	3.00		20.00	8.00	466.490	3828.610	3.00		0.050
16	466.530	3828.580	3.00		20.00	8.00	466.790	3828.550	3.00		0.262

# RUNWAYS

NUMBER OF RUNWAYS = 3

RUNWAY ID NUMBER = 16

COORDINATES (KM) (X) (Y)	AVERAGE EMISSION HEIGHT (MET)	HORIZONTAL PLUME DISPERSION (MET)	VERTICAL PLUME DISPERSION (MET)	RUNWAY VECTOR ANGLE (DEG)	RUNWAY LENGTH (KM)
464.600	3823.860	20.00	8.00	160.00	3.06

(0= RUNWAY NOT USED WHEN WIND IS FROM THIS DIRECTION 1= RUNWAY USED WHEN WIND IS FROM THIS DIRECTION)

CALM	N	NNE	NE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0

(0= RUNWAY NOT USED DURING THIS SPECIAL CASE 1= RUNWAY USED DURING THIS SPECIAL CASE)

CASE 1	CASE 2	CASE 3
0	0	0

F 4 E F 106 F 106  
20561. 751. 432. T 38 C 141A F 15 A 7  
TRANSENT 132. 77.

F 4 E F 106 F 106  
1130. 41. 24. T 38 C 141A F 15 A 7  
TRANSENT 7. 4.

INBOUND TAXIWAY ID NUMBER = 1  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 1  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
F 4 E F 106 F 106  
0.50 0.0 0.0 T 38 C 141A F 15 A 7  
TRANSENT 0.0 0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 3  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 3,

INBOUND TAXIWAY ID NUMBER = 2  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 2  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
F 4 E F 106 F 106  
0.50 0.0 0.0 T 38 C 141A F 15 A 7  
TRANSENT 0.0 0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 4, 8, 9,

INBOUND TAXIWAY ID NUMBER = 3  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 3  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
F 4 E F 106 F 106  
0.0 0.0 1.00 T 38 C 141A F 15 A 7  
TRANSENT 1.00 1.00

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 7  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 4, 8, 10, 11, 12,

INBOUND TAXIWAY ID NUMBER = 4  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 4  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
F 4 E F 106 F 106  
0.0 1.00 0.0 T 38 C 141A F 15 A 7  
TRANSENT 0.0 0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 9  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 4, 8, 10, 11, 13, 14, 16,

OUTBOUND TAXIWAY ID NUMBER = 11  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 1

FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE						
F 4 E	F 106	T 38	C 141A	F 15	A 7	TRANSP
0.50	0.0	0.0	0.0	0.0	0.0	0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 3, 4, 5, 6, 7.

OUTBOUND TAXIWAY ID NUMBER = 12  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 2

F 4 E	F 106	T 38	C 141A	F 15	A 7	FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE	TRANSIENT
0.0	0.0	0.0	0.0	0.0	0.0		0.0
0.50							

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 9, 8, 5, 6, 7,

OUTBOUND TAXIWAY ID NUMBER = 13  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYS = 3

FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE					
	T 38	C 141A	F 15	A 7	TRANSEIT
F 4 E	0.0	1.00	1.00	1.00	1.00
F 106	0.0	1.00	1.00	1.00	1.00

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 7  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 12, 11, 10, 9, 5, 6, 7,

OUTBOUND TAXIWAY ID NUMBER = 14  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 4

FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE				
	T 38	F 15	A 7	TRANSP
F 4 E	1.00	0.0	0.0	0.0
F 106	1.00	0.0	0.0	0.0
C 141A	0.0	0.0	0.0	0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 9  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 16, 14, 13, 11, 10, 8, 5, 6, 7,

- RUNWAY ID NUMBER = 34

COORDINATES (KM) (X) (Y)	AVERAGE EMISSION HEIGHT (MET)	HORIZONTAL PLUME DISPERSION (MET)	VERTICAL PLUME DISPERSION (MET)	RUNWAY VECTOR ANGLE (DEG)	RUNWAY LENGTH (KM)
464.700 3823.700	3.00	20.00	8.00	340.00	3.06

(0= RUNWAY NOT USED WHEN WIND IS FROM THIS DIRECTION)  
 1= RUNWAY USED WHEN WIND IS FROM THIS DIRECTION)  
 RUNWAY USE BY WIND DIRECTION

[illegible]

RUNWAY USE BY SPECIAL CASE WIND CONDITIONS  
 (0= RUNWAY NOT USED DURING THIS SPECIAL CASE 1= RUNWAY USED DURING THIS SPECIAL CASE)

CASE 1 CASE 2 CASE 3  
0 0 0

F 4 E F 106  
1582. 58.  
NUMBER OF ARRIVALS ON THIS RUNWAY BY AIRCRAFT TYPE  
T 38 C 141A F 15 A 7  
33. 12. 8. 6.  
TRANSENT  
10.

F 4 E F 106  
1582. 58.  
NUMBER OF DEPARTURES ON THIS RUNWAY BY AIRCRAFT TYPE  
T 38 C 141A F 15 A 7  
33. 12. 8. 6.  
TRANSENT  
10.

INBOUND TAXIWAY ID NUMBER = 21  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 1  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0 0.0  
TRANSENT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 7, 6, 5, 4, 3,

INBOUND TAXIWAY ID NUMBER = 22  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 2  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0 0.0  
TRANSENT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 7, 6, 5, 8, 9,

INBOUND TAXIWAY ID NUMBER = 23  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 3  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
T 38 C 141A F 15 A 7  
1.00 1.00 1.00 1.00  
TRANSENT  
1.00

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 7  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 7, 6, 5, 8, 10, 11, 12,

INBOUND TAXIWAY ID NUMBER = 24  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 4  
FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0 0.0  
TRANSENT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 9  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 7, 6, 5, 8, 10, 11, 13, 14, 16,

OUTBOUND TAXIWAY ID NUMBER = 31  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 1

F 4 E F 106  
0.50 0.0  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0  
TRANSIENT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 3  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 3, 2, 1,

OUTBOUND TAXIWAY ID NUMBER = 32  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 2

F 4 E F 106  
0.50 0.0  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0  
TRANSIENT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 9, 8, 4, 2, 1,

OUTBOUND TAXIWAY ID NUMBER = 33  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 3

F 4 E F 106  
0.0 0.0  
T 38 C 141A F 15 A 7  
1.00 1.00 1.00  
TRANSIENT  
1.00

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 7  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 12, 11, 10, 8, 4, 2, 1,

OUTBOUND TAXIWAY ID NUMBER = 34  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 4

F 4 E F 106  
0.0 1.00  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0  
TRANSIENT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 9  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 16, 14, 13, 11, 10, 8, 4, 2, 1,

RUNWAY ID NUMBER = 21

COORDINATES (KM) AVERAGE EMISSION HORIZONTAL PLUME VERTICAL PLUME RUNWAY VECTOR RUNWAY  
(X) HEIGHT (MET) DISPERSION (MET) DISPERSION (MET) ANGLE (DEG) LENGTH (KM)  
466.520 3828.640 3.00 20.00 6.00 210.00 2.78

(0= RUNWAY NOT USED WHEN WIND IS FROM THIS DIRECTION 1= RUNWAY USED WHEN WIND IS FROM THIS DIRECTION)  
RUNWAY USE BY WIND DIRECTION

CALM	N	NNE	NE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0

RUNWAY USE BY SPECIAL CASE WIND CONDITIONS  
 (0= RUNWAY NOT USED DURING THIS SPECIAL CASE 1= RUNWAY USED DURING THIS SPECIAL CASE)

CASE 1 CASE 2 CASE 3  
 0 0 0

F 4 E F 106  
 452. 17.  
 T 38 C 141A F 15 A 7  
 10. 4. 2. TRANSIENT 3.

F 4 E F 106  
 19884. 726.  
 T 38 C 141A F 15 A 7  
 410. 154. 106. 75. TRANSIENT 128.

INBOUND TAXIWAY ID NUMBER = 41  
 ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 1  
 FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
 F 4 E F 106  
 0.50 0.0  
 T 38 C 141A F 15 A 7  
 0.0 0.0 0.0 0.0 TRANSIENT 0.0

SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 3  
 NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 3,

INBOUND TAXIWAY ID NUMBER = 42  
 ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 2  
 FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
 F 4 E F 106  
 0.50 0.0  
 T 38 C 141A F 15 A 7  
 0.0 0.0 0.0 0.0 TRANSIENT 0.0

SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 5  
 NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 4, 8, 9,

INBOUND TAXIWAY ID NUMBER = 43  
 ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 3  
 FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
 F 4 E F 106  
 0.0 0.0  
 T 38 C 141A F 15 A 7  
 1.00 1.00 1.00 1.00 TRANSIENT 1.00

SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 7  
 NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 4, 8, 10, 11, 12,

INBOUND TAXIWAY ID NUMBER = 44  
 ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 4  
 FRACTIONAL USAGE OF THIS TAXIWAY BY AIRCRAFT TYPE  
 F 4 E F 106  
 0.0 1.00  
 T 38 C 141A F 15 A 7  
 0.0 0.0 0.0 0.0 TRANSIENT 0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 9  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 1, 2, 4, 8, 10, 11, 13, 14, 16,

OUTBOUND TAXIWAY ID NUMBER = 51  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 1

F 4 E F 106  
0.50 0.0  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0 0.0  
TRANSECT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 8  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 3, 4, 8, 10, 11, 13, 14, 15,

OUTBOUND TAXIWAY ID NUMBER = 52  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 2

F 4 E F 106  
0.50 0.0  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0 0.0  
TRANSECT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 6  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 9, 10, 11, 13, 14, 15,

OUTBOUND TAXIWAY ID NUMBER = 53  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 3

F 4 E F 106  
0.0 0.0  
T 38 C 141A F 15 A 7  
1.00 1.00 1.00 1.00  
TRANSECT  
1.00

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 4  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 12, 13, 14, 15,

OUTBOUND TAXIWAY ID NUMBER = 54  
ID OF PARKING AREA TO WHICH THIS TAXIWAY IS KEYED = 4

F 4 E F 106  
0.0 1.00  
T 38 C 141A F 15 A 7  
0.0 0.0 0.0 0.0  
TRANSECT  
0.0

NUMBER OF LINE SEGMENTS MAKING UP THIS TAXIWAY = 2  
SEQUENCE OF CATALOGUED LINE SEGMENTS MAKING UP THIS TAXIWAY = 16, 15,

# 3.1.2. INFORMATION FOR AIRCRAFT SERVICE VEHICLES

## -- ANNUAL GSE FUEL CONSUMPTION (GALLONS) --

NO G	116850.
JP 4	668850.
DESL	0.
JP 8	0.

## -- F 4 E SERVICING INFORMATION --

### GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR) NOMINAL	ADJUSTED
N1	HEATER	NO G	0.800	7.00E-01	1.40E-01
IM1	HEATER	JP 4	0.200	7.00E-01	2.97E-02
MA3	COOLER	NO G	1.000	5.80E-01	2.61E-01
MD3	GENERATR	NO G	0.095	5.30E-01	6.80E-02
AN32A60	GENERATR	JP 4	0.905	1.10E+00	1.14E+00
MC1A	CMPRESOR	NO G	0.214	5.80E-01	1.68E-01
NF2	LIGHT ST	NO G	1.000	1.25E+00	1.69E+00
N3211	LEAK TST	NO G	1.000	4.00E-02	5.40E-02

### REFUELING (JP 4)

AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS).....	7570.00
AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS).....	1.00
AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS).....	1.40
AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS).....	1.40

## -- F 106 SERVICING INFORMATION --

### GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR) NOMINAL	ADJUSTED
MA3	COOLER	NO G	1.000	5.80E-01	2.61E-01
MD3	GENERATR	NO G	0.095	5.30E-01	6.80E-02
NF2	LIGHT ST	NO G	1.000	1.25E+00	1.69E+00

### REFUELING (JP 4)



AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS)..... 3785.00  
 AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS)..... 1.00  
 AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS)..... 0.70  
 AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS)..... 0.70

-- T 30 SERVICING INFORMATION --

GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR) NOMINAL	ADJUSTED
H1	HEATER	NO G	0.800	0.0	0.0
MA3	COOLER	NO G	1.000	0.0	0.0
MD3	GENERATOR	NO G	0.095	5.30E-01	6.80E-02
AM32A60	GENERATOR	JP 4	0.905	0.0	0.0
MC1A	COMPRESSOR	NO G	0.214	0.0	0.0
NF2	LIGHT ST	NO G	1.000	0.0	0.0

REFUELING (JP 4)

AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS)..... 815.00  
 AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS)..... 1.00  
 AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS)..... 0.70  
 AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS)..... 0.70

-- C 141A SERVICING INFORMATION --

GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR) NOMINAL	ADJUSTED
H1	HEATER	NO G	0.800	3.21E+00	6.42E-01
MA3	COOLER	NO G	1.000	1.33E+00	5.99E-01
MD3	GENERATOR	NO G	0.095	3.12E+00	4.00E-01
AM32A60	GENERATOR	JP 4	0.905	3.85E+00	3.99E+00
MC1A	COMPRESSOR	NO G	0.214	7.50E-01	2.17E-01
NF2	LIGHT ST	NO G	1.000	3.18E+00	4.29E+00

REFUELING (JP 4)

AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS)..... 20390.00  
 AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS)..... 1.00  
 AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS)..... 2.80  
 AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS)..... 2.80

-- F 15 SERVICING INFORMATION --

GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR)	
				NOMINAL	ADJUSTED
H1	HEATER	NO G	0.800	7.00E-01	1.40E-01
MA3	COOLER	NO G	1.000	0.0	0.0
MD3	GENERATH	NO G	0.095	0.0	0.0
AM32A60	GENERATH	JP 4	0.905	1.10E+00	1.14E+00
MC1A	CMPRESOR	NO G	0.214	5.80E-01	1.68E-01
NF2	LIGHT ST	NO G	1.000	1.25E+00	1.69E+00

REFUELING (JP 4)

AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS)..... 7570.00  
 AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS)..... 1.00  
 AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS)..... 1.40  
 AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS)..... 1.40

-- A 7 SERVICING INFORMATION --

GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR)	
				NOMINAL	ADJUSTED
H1	HEATER	NO G	0.800	2.30E-01	4.60E-02
MA3	COOLER	NO G	1.000	0.0	0.0
MD3	GENERATH	NO G	0.095	0.0	0.0
AM32A60	GENERATH	JP 4	0.905	4.41E+00	4.57E+00
MC1A	CMPRESOR	NO G	0.214	1.00E-01	2.89E-02
NF2	LIGHT ST	NO G	1.000	2.30E-01	3.11E-01

REFUELING (JP 4)

AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS)..... 4542.00  
 AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS)..... 0.0  
 AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS)..... 0.0  
 AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS)..... 0.0

-- TRANSENT SERVICING INFORMATION --

GROUND SUPPORT EQUIPMENT

GSE NAME	CATEGORY	FUEL	USAGE	SERVICE TIME (HR)	
				NOMINAL	ADJUSTED
H1	HEATER	NO G	0.800	0.0	1.36E-01
IM1	HEATER	JP 4	0.200	0.0	2.76E-02
MA3	COOLER	NO G	1.000	0.0	2.56E-01
MD3	GENERATH	NO G	0.095	0.0	6.98E-02
AM32A00	GENERATH	JP 4	0.905	0.0	1.11E+00
MC1A	CMPRESOR	NO G	0.214	0.0	1.58E-01
MF2	LIGHT ST	NO G	1.000	0.0	1.67E+00
M32T1	LEAK TST	NO G	1.000	0.0	5.03E-02

#### REFUELING (JP 4)

AVERAGE AMOUNT OF FUEL USED PER FILLUP (LITERS).....	6435.00
AVERAGE AMOUNT OF FUEL SPILLED PER FILLUP (LITERS).....	2.00
AVERAGE AMOUNT OF FUEL VENTED PER ARRIVAL (LITERS).....	2.80
AVERAGE AMOUNT OF FUEL VENTED PER DEPARTURE (LITERS).....	2.80

# 3.1.3. SUMMARY OF ANNUAL EMISSIONS BY AIRCRAFT TYPE

ALL POLLUTANTS IN METRIC TONS

F 4 E

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	9.2941E+01	2.0860E+01	6.2579E+00	5.3308E-01	2.3177E+00
TAXI OUT	1.0467E+02	2.3492E+01	7.0475E+00	6.0034E-01	2.6102E+00
ENGINE CHECK	4.8311E+00	1.6104E-02	3.9723E+01	5.9584E+00	2.5840E+00
RUNWAY ROLL	1.6922E+01	4.2305E-02	1.3157E+01	6.3457E-01	4.2305E+00
CLIMB 1	1.8951E+01	4.7377E-02	1.4734E+01	7.1066E-01	4.7377E+00
CLIMB 2	1.8278E+00	6.0927E-03	1.5029E+01	2.2543E+00	1.0155E+00
APPROACH 1	6.2031E+01	1.3884E+01	1.2317E+01	1.9259E+00	2.2394E+00
APPROACH 2	1.6631E+01	3.7247E+00	2.8085E+00	4.2113E-01	5.5840E-01
LANDING	1.3651E+01	3.0637E+00	9.1912E-01	7.8295E-02	3.4041E-01
TAXI IN	5.4073E+01	1.2136E+01	3.6408E+00	3.1014E-01	1.3485E+00
SHUTDOWN	5.8085E+00	1.3037E+00	3.9110E-01	3.3316E-02	1.4485E-01
ARR + DEP SV	6.2028E+02	2.5573E+01	2.8988E+01	3.0573E+00	3.8328E+00
FUEL VENTING	0.0	4.8905E+01	0.0	0.0	0.0
FILL + SPILL	0.0	4.6571E+01	0.0	0.0	0.0
TOUCH + GO	1.2978E+02	2.2229E+01	5.9928E+01	6.8251E+00	1.1920E+01
TOTAL	1.1424E+03	2.2185E+02	2.0494E+02	2.3342E+01	3.7979E+01

F 106

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	6.6596E+00	5.5755E+00	1.7811E-01	1.7811E-02	7.7437E-02
TAXI OUT	1.6699E+00	1.3980E+00	4.4660E-02	4.4660E-03	1.9417E-02
ENGINE CHECK	2.0988E-01	1.6145E-02	1.9374E+00	1.7436E-01	1.6145E-01
RUNWAY ROLL	5.9394E-01	1.4849E-03	4.6179E-01	2.2273E-02	1.4849E-01
CLIMB 1	5.4282E-01	1.3570E-03	4.2204E-01	2.0356E-02	1.3570E-01
CLIMB 2	3.1279E-02	2.4060E-03	2.8873E-01	2.5985E-02	2.4060E-02
APPROACH 1	7.1368E-01	2.1206E-01	1.7536E-01	1.7944E-02	4.0782E-02
APPROACH 2	3.8933E-01	2.4022E-01	4.5170E-02	4.6077E-03	1.1752E-02
LANDING	8.3329E-01	6.9764E-01	2.2286E-02	2.2286E-03	9.6894E-03
TAXI IN	1.0222E+01	8.5581E+00	2.7338E-01	2.7338E-02	1.1886E-01
SHUTDOWN	1.6669E+00	1.3956E+00	4.4580E-02	4.4580E-03	1.9383E-02
ARR + DEP SV	1.6627E+01	7.7512E-01	3.9832E-01	2.8304E-02	3.4403E-03
FUEL VENTING	0.0	8.9281E-01	0.0	0.0	0.0
FILL + SPILL	0.0	1.1691E+00	0.0	0.0	0.0
TOUCH + GO	2.2627E+00	5.6000E-01	1.2947E+00	8.6577E-02	3.2955E-01
TOTAL	4.2422E+01	2.1495E+01	5.5865E+00	4.3671E-01	1.1000E+00

T 38

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	3.0113E+00	5.0753E-01	2.1993E-02	5.0753E-05	1.6918E-02
TAXI OUT	5.9581E+00	1.0042E+00	4.3514E-02	1.0042E-04	3.3473E-02
ENGINE CHECK	1.6433E-01	4.5332E-03	1.4733E-02	1.0200E-04	5.6665E-03
RUNWAY ROLL	5.1622E-01	1.3877E-03	3.9450E-02	1.5859E-04	1.9824E-02
CLIMB 1	4.5760E-01	1.2301E-03	3.4970E-02	1.4058E-04	1.7573E-02
CLIMB 2	2.7448E-01	7.5718E-03	2.4609E-02	1.7037E-04	9.4648E-03
APPROACH 1	9.6719E-01	7.8725E-02	5.1733E-02	2.4742E-04	2.2493E-02
APPROACH 2	1.3693E-01	1.6645E-02	4.4091E-03	1.9946E-05	2.0711E-03
LANDING	7.2978E-01	1.2300E-01	5.3298E-03	1.2300E-05	4.0999E-03
TAXI IN	5.0624E+00	8.5321E-01	3.6972E-02	8.5320E-05	2.8440E-02
SHUTDOWN	4.0537E-01	6.8321E-02	2.9606E-03	6.8321E-06	2.2774E-03
ARR + DEP SV	1.3921E+00	5.4006E-02	3.6060E-02	2.3078E-03	2.2502E-04
FUEL VENTING	0.0	5.1404E-01	0.0	0.0	0.0
FILL + SPILL	0.0	4.3305E-01	0.0	0.0	0.0
TOUCH + GO	2.1966E+00	1.1336E-01	1.3983E-01	6.7464E-04	6.3816E-02
	-----	-----	-----	-----	-----
TOTAL	2.1272E+01	3.7808E+00	4.5657E-01	4.0770E-03	2.2634E-01

C 141A

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	5.2512E+00	4.3478E+00	1.0164E-01	6.2111E-03	5.6465E-02
TAXI OUT	4.7499E+00	3.9328E+00	9.1934E-02	5.6182E-03	5.1075E-02
ENGINE CHECK	3.6878E-03	1.3829E-04	5.5317E-02	4.1949E-03	4.6098E-03
RUNWAY ROLL	1.2762E-02	4.7859E-04	1.9143E-01	1.4517E-02	1.5953E-02
CLIMB 1	1.9350E-02	7.2561E-04	2.9024E-01	2.2010E-02	2.4187E-02
CLIMB 2	1.9744E-02	7.4039E-04	2.9616E-01	2.2459E-02	2.4680E-02
APPROACH 1	3.4277E-01	9.0070E-02	9.5074E-02	9.7576E-03	2.5019E-02
APPROACH 2	4.5827E-01	2.9107E-01	4.9205E-02	4.8073E-03	1.4657E-02
LANDING	6.5413E-01	5.4159E-01	1.2661E-02	7.7371E-04	7.0337E-03
TAXI IN	4.0344E+00	3.3403E+00	7.8085E-02	4.7719E-03	4.3380E-02
SHUTDOWN	7.8768E-01	6.5217E-01	1.5245E-02	9.3167E-04	8.4697E-03
ARR + DEP SV	1.3305E+01	5.3505E-01	6.8993E-01	7.6208E-02	1.0298E-01
FUEL VENTING	0.0	7.5754E-01	0.0	0.0	0.0
FILL + SPILL	0.0	9.8067E-01	0.0	0.0	0.0
TOUCH + GO	4.8401E-03	2.2145E-03	4.2590E-03	3.4368E-04	5.1325E-04
	-----	-----	-----	-----	-----
TOTAL	2.9644E+01	1.5473E+01	1.9712E+00	1.7260E-01	3.7902E-01

F 15

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	4.6277E-01	6.1703E-02	6.3631E-02	2.3139E-03	1.9282E-02
TAXI OUT	3.7321E-01	4.9761E-02	5.1316E-02	1.8660E-03	1.5550E-02
ENGINE CHECK	2.1075E-03	2.3417E-04	6.3225E-02	7.9617E-04	2.3417E-03
RUNWAY ROLL	7.6529E-02	1.1479E-02	5.9501E-02	2.8698E-03	1.9132E-02
CLIMB 1	1.1032E-01	1.6547E-02	8.5770E-02	4.1368E-03	2.7579E-02

CLIMB 2	4.9447E-03	5.4941E-04	1.4834E-01	1.8680E-03	5.4941E-03
APPROACH 1	3.323E-02	1.0487E-02	3.8390E-02	1.5471E-03	5.7299E-03
APPROACH 2	2.6621E-02	5.7950E-03	1.5424E-02	6.1343E-04	2.6206E-03
LANDING	6.2314E-02	8.3085E-03	8.5682E-03	3.1157E-04	2.5964E-03
TAXI IN	3.1415E-01	4.1887E-02	4.3196E-02	1.5708E-03	1.3090E-02
SHUTDOWN	1.5297E-02	2.0396E-03	2.1034E-03	7.6486E-05	6.3738E-04
ARR + DEP SV	1.4598E+00	6.4330E-02	1.0435E-01	1.3045E-02	2.0017E-02
FUEL VENTING	0.0	2.5973E-01	0.0	0.0	0.0
FILL + SPILL	0.0	2.4733E-01	0.0	0.0	0.0
TOUCH + GO	1.9118E-01	3.6234E-02	2.9974E-01	8.7299E-03	4.5146E-02
	-----	-----	-----	-----	-----
TOTAL	3.1325E+00	8.1682E-01	9.8356E-01	3.9745E-02	1.7922E-01

A 7

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	1.1573E+00	8.9475E-01	1.4588E-02	1.4588E-03	9.7256E-03
TAXI OUT	4.6761E-01	3.6151E-01	5.8942E-03	5.8942E-04	3.9295E-03
ENGINE CHECK	1.9476E-02	2.1640E-03	2.2722E-01	7.2493E-03	1.0820E-02
RUNWAY ROLL	4.1554E-03	4.6171E-04	4.8479E-02	1.5467E-03	2.3085E-03
CLIMB 1	8.4349E-03	9.3722E-04	9.8408E-02	3.1397E-03	4.6861E-03
CLIMB 2	3.1975E-05	3.5528E-06	3.7304E-04	1.1902E-05	1.7764E-05
APPROACH 1	4.3701E-02	9.4258E-03	2.9134E-02	1.5424E-03	4.2845E-03
APPROACH 2	3.1518E-02	1.8948E-02	6.7556E-03	3.7059E-04	1.1362E-03
LANDING	9.1542E-02	7.0772E-02	1.1539E-03	1.1539E-04	7.6926E-04
TAXI IN	3.9749E-01	3.0730E-01	5.0104E-03	5.0104E-04	3.3403E-03
SHUTDOWN	2.3147E-01	1.7895E-01	2.9177E-03	2.9177E-04	1.9451E-03
ARR + DEP SV	1.3380E+00	1.8404E-02	2.3788E-01	3.2090E-02	5.5929E-02
FUEL VENTING	0.0	0.0	0.0	0.0	0.0
FILL + SPILL	0.0	6.5693E-02	0.0	0.0	0.0
TOUCH + GO	8.5890E-02	3.0687E-02	1.4054E-01	5.2533E-03	1.0417E-02
	-----	-----	-----	-----	-----
TOTAL	3.8766E+00	1.9600E+00	8.1835E-01	5.4160E-02	1.0931E-01

OPERATION	CO	HC	NOX	PM	SOX
STARTUP	1.0495E+00	2.2074E-01	4.5987E-02	9.1974E-03	1.8395E-02
TAXI OUT	9.9318E-01	2.0909E-01	4.3560E-02	8.7121E-03	1.7424E-02
ENGINE CHECK	3.4453E-02	3.1321E-03	1.3938E-01	3.4453E-02	1.5660E-02
RUNWAY ROLL	1.0016E-01	2.5041E-04	7.7877E-02	3.7561E-03	2.5041E-02
CLIMB 1	1.1217E-01	2.8043E-04	8.7215E-02	4.2065E-03	2.8043E-02
CLIMB 2	1.3035E-02	1.1850E-03	5.2733E-02	1.3035E-02	5.9250E-03
APPROACH 1	1.5859E-01	2.0103E-02	4.5790E-02	1.5635E-02	1.1168E-02
APPROACH 2	7.8741E-02	1.3697E-02	1.1874E-02	3.7794E-03	3.1998E-03
LANDING	1.6683E-01	3.5121E-02	7.3170E-03	1.4634E-03	2.9268E-03
TAXI IN	8.4371E-01	1.7762E-01	3.7005E-02	7.4010E-03	1.4802E-02
SHUTDOWN	6.5531E-01	1.3796E-02	2.8742E-03	5.7484E-04	1.1497E-03
ARR + DEP SV	3.9089E+00	1.6139E-01	1.8191E-01	1.9169E-02	2.3985E-02
FUEL VENTING	0.0	6.2768E-01	0.0	0.0	0.0
FILL + SPILL	0.0	3.8294E-01	0.0	0.0	0.0

TUNCH + GU	3.7778E-01	3.5934E-02	2.0724E-01	3.7141E-02	5.1442E-02
	-----	-----	-----	-----	-----
TOTAL	7.9015E+00	1.9030E+00	9.4076E-01	1.5852E-01	2.1916E-01

## 3.2. AIRBASE GROUND MOBILE

### 3.2.1. VEHICLE AGE DISTRIBUTION

VEHICLE EMISSION AREA IS SET FOR LOW ALTITUDE

#### MILITARY VEHICLE INFORMATION

HEAVY DUTY GASOLINE POWERED MILITARY VEHICLE EMISSION FACTORS ARE DEPENDENT ON GROSS VEHICLE WEIGHT

MILITARY VEHICLE AGE DISTRIBUTION SUPPLIED BY USER

DISTRIBUTION OF VEHICLE CLASSES (BREAKDOWN BY AGE, 0 THROUGH 15 YEARS), 0 = 1983, 1 = 1982, 2 = 1981 . . .																	
CLASS	OPTION	( 0 )	( 1 )	( 2 )	( 3 )	( 4 )	( 5 )	( 6 )	( 7 )	( 8 )	( 9 )	( 10 )	( 11 )	( 12 )	( 13 )	( 14 )	( 15 )
1	0	.0	.115	.0	.077	.269	.308	.0	.0	.0	.0	.077	.039	.115	.0	.0	.0
2	0	.0	.258	.061	.031	.098	.129	.049	.123	.105	.049	.0	.049	.006	.012	.012	.018
3	0	.0	.007	.100	.079	.121	.121	.029	.207	.150	.029	.014	.036	.0	.036	.0	.071
4	0	.0	.0	.0	.083	.334	.083	.0	.0	.0	.0	.167	.167	.0	.083	.0	.083
5	0	.0	.0	.0	.017	.0	.017	.0	.017	.017	.017	.017	.034	.052	.174	.017	.621
6	0	.038	.150	.057	.150	.057	.0	.019	.038	.019	.132	.038	.094	.019	.057	.019	.113

OPTION 0 IS USER SUPPLIED DATA

OPTION 1 IS DEFAULT DATA

#### CIVILIAN VEHICLE INFORMATION

HEAVY DUTY GASOLINE-POWERED CIVILIAN VEHICLE EMISSION FACTORS ARE DEPENDENT ON GROSS VEHICLE WEIGHT

NATIONAL VEHICLE AGE DISTRIBUTION USED FOR CIVILIAN VEHICLES



# 3.2.2. MILITARY VEHICLE AREA SOURCES

## VEHICLE INPUT

ID	OPTION	SPEED (MPH)	THOUSANDS OF MILES PER VEHICLE CLASS PER YEAR						COLD STARTS PER VEHICLE CLASS PER YEAR						ANN. HOT SOAKS	
			(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)		
3701.	2	30.00	350.00	3050.00	1048.00	100.00	63.00	1050.00	0	0	0	0	0	0	0	

## SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SOX
3701.	1.4365E+05	1.9578E+04	1.0685E+05	4.4030E+03	3.6038E+03
TOTAL ANNUAL	1.4365E+05	1.9578E+04	1.0685E+05	4.4030E+03	3.6038E+03

# 3.2.3. CIVILIAN VEHICLE AREA SOURCES

## VEHICLE INPUT

ID	OPTION	SPEED (MPH)	THOUSANDS OF MILES PER VEHICLE CLASS PER YEAR						CULD STARTS PER VEHICLE CLASS PER YEAR						ANN. HUT SOAKS
			(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	
3801.	2	30.00	3133.00	553.00	78.00	23.40	7.80	23.40	0	0	0	0	0	0	0

## SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SOX
3801.	2.7473E+04	3.3600E+03	7.3061E+03	2.2293E+03	8.1520E+02
TOTAL ANNUAL	2.7473E+04	3.3600E+03	7.3061E+03	2.2293E+03	8.1520E+02

3.2.4. MILITARY VEHICLE LINE SOURCES

NO INPUT DATA FOR SECTION 3.2.4.

3.2.5. CIVILIAN VEHICLE LINE SOURCES

HU INPUT DATA FOR SECTION 3.2.5.

# 3.3. AIRBASE FACILITIES

## 3.3.1. TRAINING FIRES

### EMISSION INPUT

SOURCE ID	ANNUAL NO. OF FIRES	FUEL/FIRE (GALLONS)
2001.	24.000	350.000

### SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SUX
2001.	1.3763E+04	7.8646E+03	1.0199E+02	3.1458E+03	2.4577E+01
TOTAL ANNUAL	1.3763E+04	7.8646E+03	1.0199E+02	3.1458E+03	2.4577E+01

### 3.3.2. TEST CELLS

ENGINE INPUTS (TIMES TAKEN IN MINUTES)						
SOURCE ID	ENGINE ID	ANNUAL TESTS	IDLE TIME	NORMAL TIME	MILITARY TIME	AFTERBURNER TIME
2101.	15	220.0	30.0	15.0	10.0	5.0
2102.	15	350.0	30.0	5.0	15.0	10.0

### SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SOX
2101.	5.9521E+03	1.0137E+03	3.9055E+03	4.8667E+02	5.9018E+02
2102.	9.0340E+03	1.0683E+03	9.1057E+03	1.0595E+03	1.4428E+03
	-----	-----	-----	-----	-----
TOTAL ANNUAL	1.4986E+04	2.0819E+03	1.3011E+04	1.5462E+03	2.0330E+03

### 3.3.3. HUNUP STANDS

#### ENGINE INPUTS (TIMES TAKEN IN MINUTES)

SOURCE ID	ENGINE ID	ANNUAL TESTS	IDLE TIME	NORMAL TIME	MILITARY TIME	AFTERSHOWER TIME
2201.	15	180.0	15.0	8.0	13.0	5.0
2202.	15	250.0	100.0	10.0	10.0	0.0
2203.	15	250.0	100.0	10.0	10.0	0.0
2204.	15	250.0	100.0	10.0	10.0	0.0

#### SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SOX
2201.	3.1678E+03	4.3660E+02	3.5617E+03	4.5611E+02	4.6951E+02
2202.	1.0167E+04	2.2119E+03	3.6223E+03	5.0986E+02	4.4906E+02
2203.	1.0167E+04	2.2119E+03	3.6223E+03	5.0986E+02	4.4906E+02
2204.	1.0167E+04	2.2119E+03	3.6223E+03	5.0986E+02	4.4906E+02
	-----	-----	-----	-----	-----
TOTAL ANNUAL	3.3668E+04	7.0721E+03	1.4429E+04	1.9857E+03	1.8167E+03

#### 3.3.4. POWER PLANTS

NO INPUT DATA FOR SECTION 3.3.4.



# 3.3.5. INCINERATORS

## EMISSION INPUT

SOURCE ID	EMISSION FACTOR ID	WASTE MATERIAL BURNED (MET TONS)	CONTROL FLAG	CO	HC	NOX	PM	SOX
2401.	1	1.18	0	.0	.0	.0	.0	.0

## SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SOX
2401.	0.0	0.0	1.7700E+00	5.9000E+00	0.0
TOTAL ANNUAL	0.0	0.0	1.7700E+00	5.9000E+00	0.0

3.3.6. OTHER POINT SOURCES

NO INPUT DATA FOR SECTION 3.3.6.

# 3.3.7. SPACE HEATING AREA SOURCES

## FUEL AND FURNACE INPUT

SOURCE ID	EMISSION FACTOR ID	PERCENT SULFUR	PERCENT ASH	FUEL USAGE APPROP UNITS	CONTROL FLAG	CO	HC	NOX	PM	SOX
3501.	16	0.000	0.000	10.24	0	.0	.0	.0	.0	.0

## SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	CO	HC	NOX	PM	SOX
3501.	3.2750E+03	1.3103E+03	1.3103E+04	1.6379E-01	9.8275E-03
TOTAL ANNUAL	3.2750E+03	1.3103E+03	1.3103E+04	1.6379E-01	9.8275E-03

3.3.8. AIRBASE NON-AIRCRAFT LINE SOURCES

NO INPUT DATA FOR SECTION 3.3.8.

# 3.4. AIRBASE EVAPORATIVE HYDROCARBONS

## 3.4.1. STORAGE TANKS -- PUMPS

### EMISSION INPUT

SOURCE ID	FUEL ROOF ID	ANNUAL FUEL USE (KILOLIT)	TANK CAP (KILOLIT)	TANK TEMP (DEG F)	AVG DAILY TEPP VAP (DEG F)	TANK DIAMETER (METERS)	TANK TYPE (ABOVE, BELOW GROUND)	NUMBER OF TANKS	VAPOR HEIGHT (METERS)	THROUGHPUT FACTOR	PAINT FACTOR	DIAMETER FACTOR
2501.	2	36924.000	1590.000	62.00	13.50	13.00	ABOVE	1	0.10	1.00	1.00	1.00
2502.	2	18462.000	795.000	62.00	13.50	9.10	ABOVE	1	0.10	1.00	1.00	1.00
2503.	2	55385.000	2385.000	62.00	13.50	15.80	ABOVE	1	0.10	1.00	1.00	1.00
2504.	2	36924.000	1590.000	62.00	13.50	13.00	ABOVE	1	0.10	1.00	1.00	1.00
2505.	2	55385.000	2385.000	62.00	13.50	15.20	ABOVE	1	0.10	1.00	1.00	1.00
2506.	1	1150.000	37.850	62.00	0.0	2.40	BELOW	2	1.00	1.00	1.20	1.00
2507.	1	9435.000	37.850	62.00	0.0	2.40	BELOW	3	1.00	1.00	1.20	1.00

### SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	WORKING LOSS	FIXED ROOF BREATHING LOSS	FLOATING ROOF BREATHING LOSS
2501.	0.0	0.0	524.067
2502.	0.0	0.0	306.926
2503.	0.0	0.0	702.196
2504.	0.0	0.0	524.067
2505.	0.0	0.0	662.579
2506.	2903.269	0.0	
2507.	35729.152	0.0	
TOTAL ANNUAL	38632.396	0.0	2719.814

3.4.2. STORAGE TANKS -- AREAS

NO INPUT DATA FOR SECTION 3.4.2.

3.4.3. FUEL TRANSFER AND FILLING AREAS

NO INPUT DATA FOR SECTION 3.4.3.

# 3.4.4. TANK TRUCK PARKING AREAS

## EMISSION INPUT

SOURCE ID 3201.	FUEL ID 2	NUMBER OF TANK TRUCKS 21	AVG TANK CAPACITY (KILOLITERS) 18.90	AVERAGE FRACTION OF TANK FILLED 1.00	AVG TANK DIAMETER (METERS) 2.60
-----------------------	-----------------	--------------------------------	---	---	--

## SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	BREATHING LOSS
3201.	0.0
TOTAL ANNUAL	0.0



# 3.4.5. VEHICLE PARKING AREAS

## EMISSION INPUT

SOURCE ID	FUEL ID	NUM OF VEHICLES IN AREA	AVG TANK CAPACITY (LITERS)	AVERAGE FRACTION OF TANK FILLED
3301.	1	5200	60.00	0.50

## SOURCE EMISSION DATA (KILOGRAMS/YEAR)

SOURCE ID	BREATHING LOSS
-----------	----------------

3301.	7.027E+04
-------	-----------

TOTAL ANNUAL	7.027E+04
--------------	-----------

3.4.5. OTHER EVAPORATIVE AREA SOURCES

NO INPUT DATA FOR SECTION 3.4.6.

3.5. ENVIRONMENT (OFF AIRBASE) EMISSIONS

3.5.1. POINT SOURCES

NO INPUT DATA FOR SECTION 3.5.1.

3.5.2. ENVIRON STATIONARY AREAS

NO INPUT DATA FOR SECTION 3.5.2.

3.5.3. ENVIRON MOBILE AREAS

NO INPUT DATA FOR SECTION 3.5.3.

3.5.4. ENVIRON ROADWAY LINES

NO INPUT DATA FOR SECTION 3.5.4.

3.5.5. ENVIRON NON-ROADWAY LINES

NO INPUT DATA FOR SECTION 3.5.5.

### 3.6. METEOROLOGICAL DATA SUMMARY

AVERAGE ANNUAL TEMPERATURE (DEGREES F).....	62.00
ANNUAL DEGREE DAYS.....	2942.00
AVERAGE ANNUAL WIND SPEED (METERS PER SECOND).....	0.32
DAILY AVERAGE TEMPERATURE VARIATION (DEGREES F).....	13.50



**APPENDIX C**

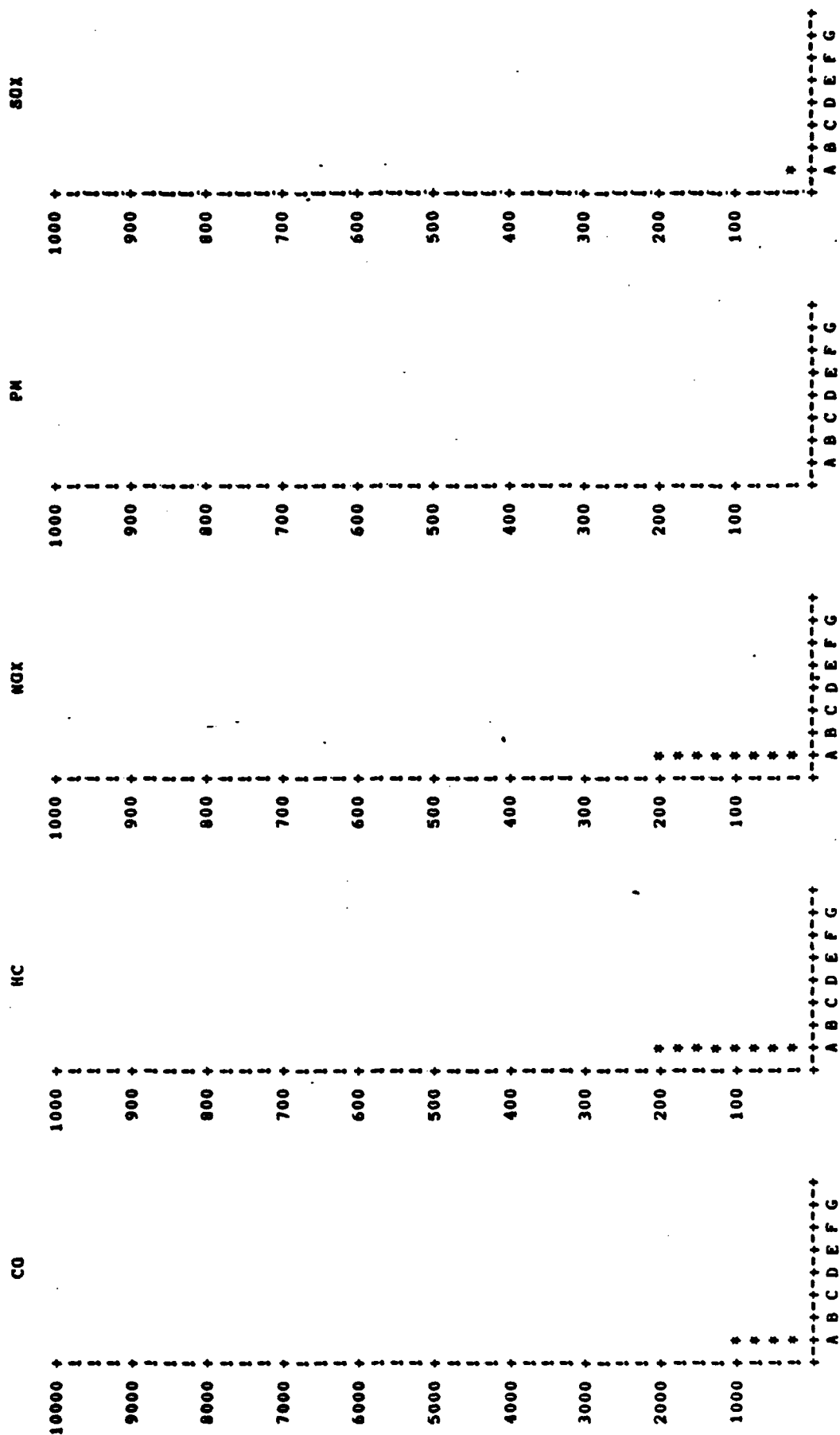
**Emission Inventory Histogram, George AFB**

# SUMMARY OF ANNUAL EMISSIONS BY AIRCRAFT TYPE

## ALL POLLUTANTS IN METRIC TONS

	CO	HC	NOX	PM	SOX
A. F 4 E	1142.395	221.853	204.940	23.342	37.979
B. F 106	42.422	21.495	5.587	0.437	1.100
C. T 38	21.272	3.781	0.457	0.004	0.226
D. C 141A	29.644	15.473	1.971	0.173	0.379
E. F 15	3.133	0.817	0.984	0.040	0.179
F. A 7	3.877	1.960	0.818	0.054	0.109
G. TRANSENT	7.902	1.903	0.941	0.159	0.219

**SUMMARY OF ANNUAL EMISSIONS BY AIRCRAFT TYPE**  
**ALL POLLUTANTS IN METRIC TONS**



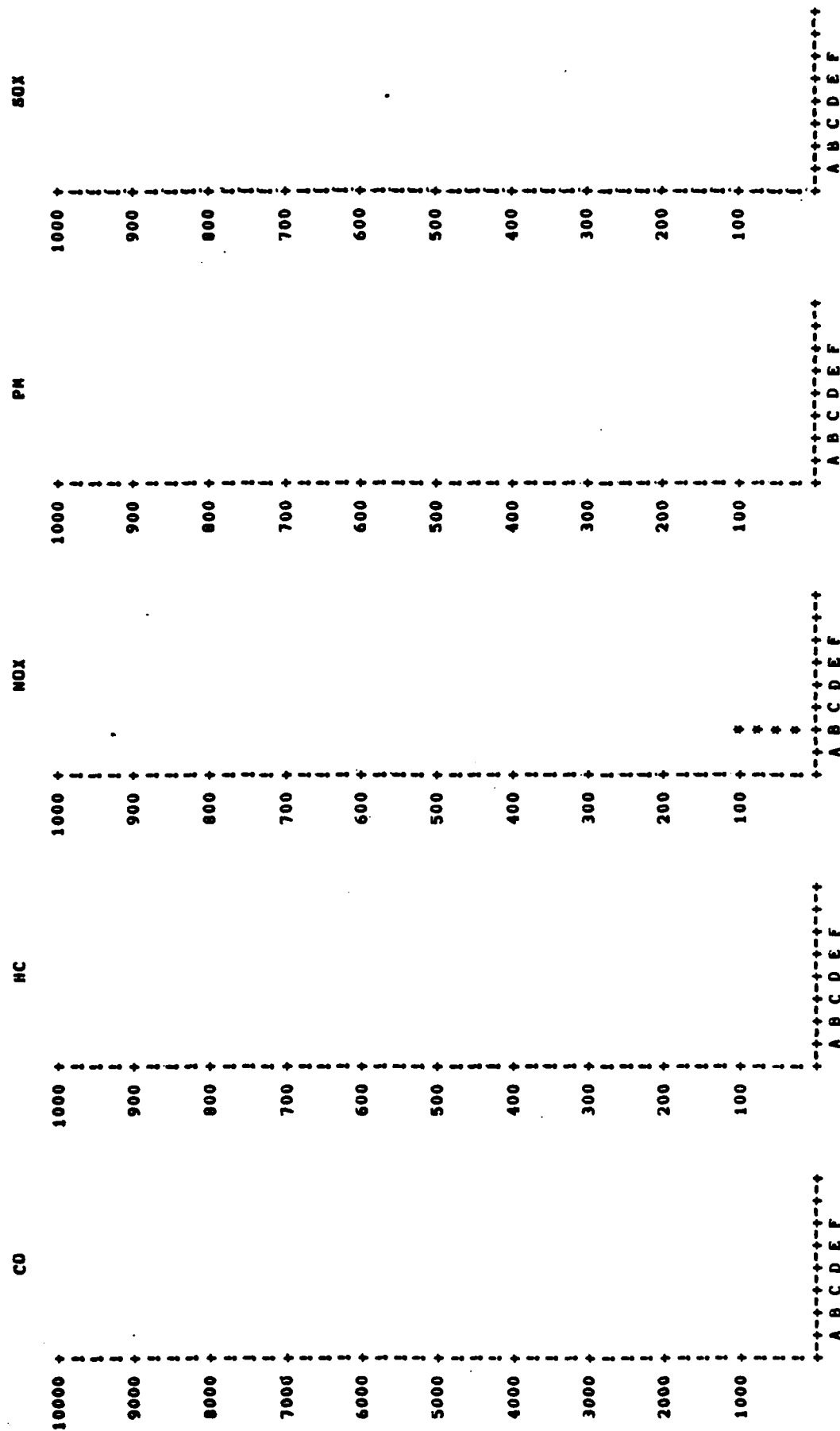
A. F 4 E  
 B. F 106  
 C. T 38  
 D. C 141A  
 E. F 15  
 F. A 7  
 G. THANSENT

# SUMMARY OF ANNUAL EMISSIONS FROM GROUND MOBILE SOURCES

ALL POLLUTANTS IN METRIC TONS		CO	HC	NOX	PM	SOX
A.	OFF ROAD VEH	0.0	0.0	0.0	0.0	0.0
B.	MILITARY VEH	143.645	19.578	106.851	4.403	3.604
C.	CIVILIAN VEH	27.473	3.360	7.306	2.229	0.815
D.	MIL VEH LINE	0.0	0.0	0.0	0.0	0.0
E.	CIV VEH LINE	0.0	0.0	0.0	0.0	0.0
F.	OTHER AB LMS	0.0	0.0	0.0	0.0	0.0

# SUMMARY OF ANNUAL EMISSIONS FROM GROUND MOBILE SOURCES

## ALL POLLUTANTS IN METRIC TONS



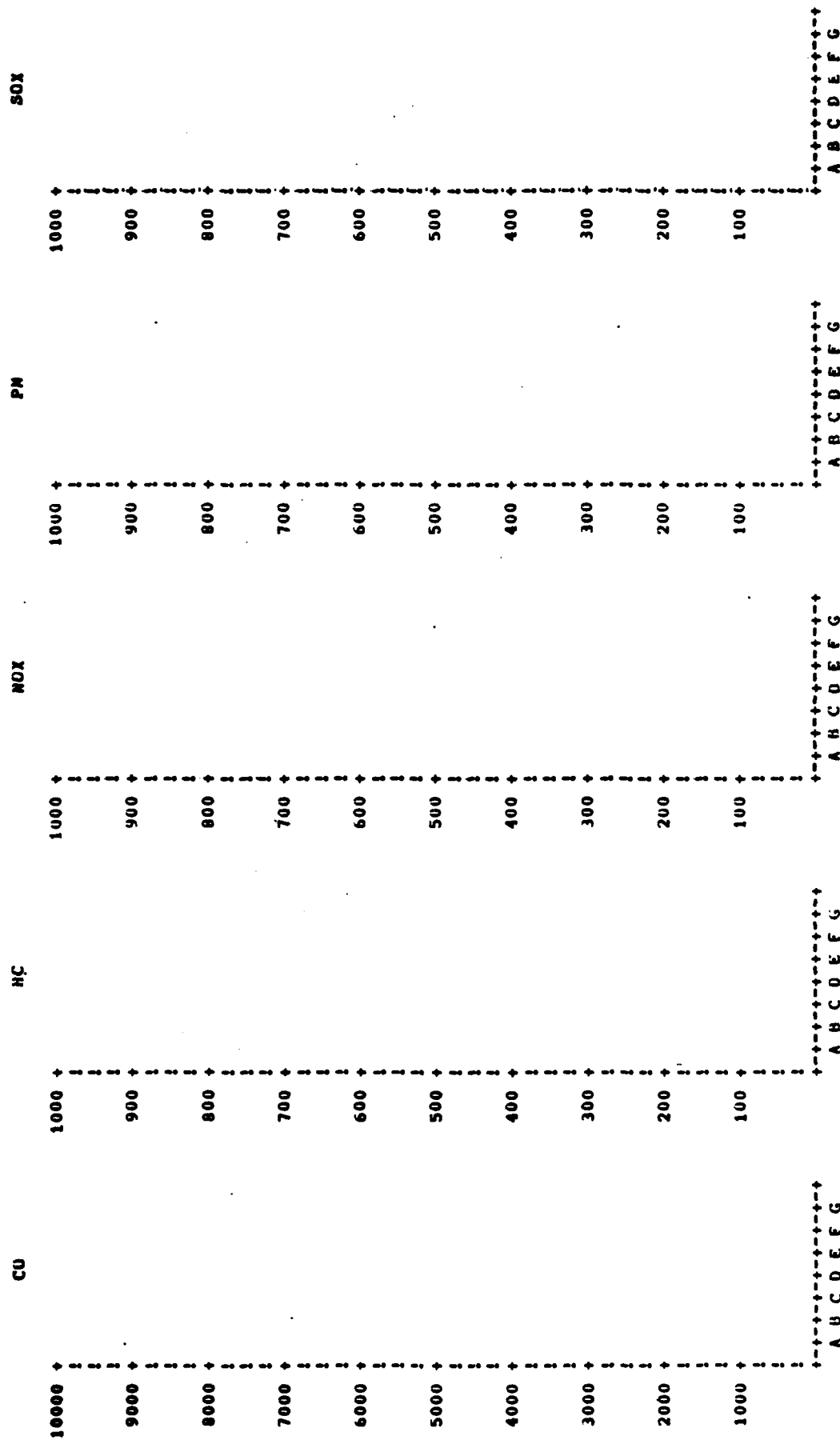
A. OFF ROAD VEH  
 B. MILITARY VEH  
 C. CIVILIAN VEH  
 D. MIL VEH LINE  
 E. CIV VEH LINE  
 F. OTHER AB LNS

# SUMMARY OF ANNUAL EMISSIONS FROM AIRBASE FACILITIES

ALL POLLUTANTS IN METRIC TONS		CO		HC		NOX		PM		SOX	

# SUMMARY OF ANNUAL EMISSIONS FROM AIRBASE FACILITIES

## ALL POLLUTANTS IN METRIC TONS



- A. TRAIN FIRES
- B. TEST CELLS
- C. RUN-UP STDS
- D. POWER PLANTS
- E. INCINERATORS
- F. OTHER AB PTS
- G. SPACE HEATING

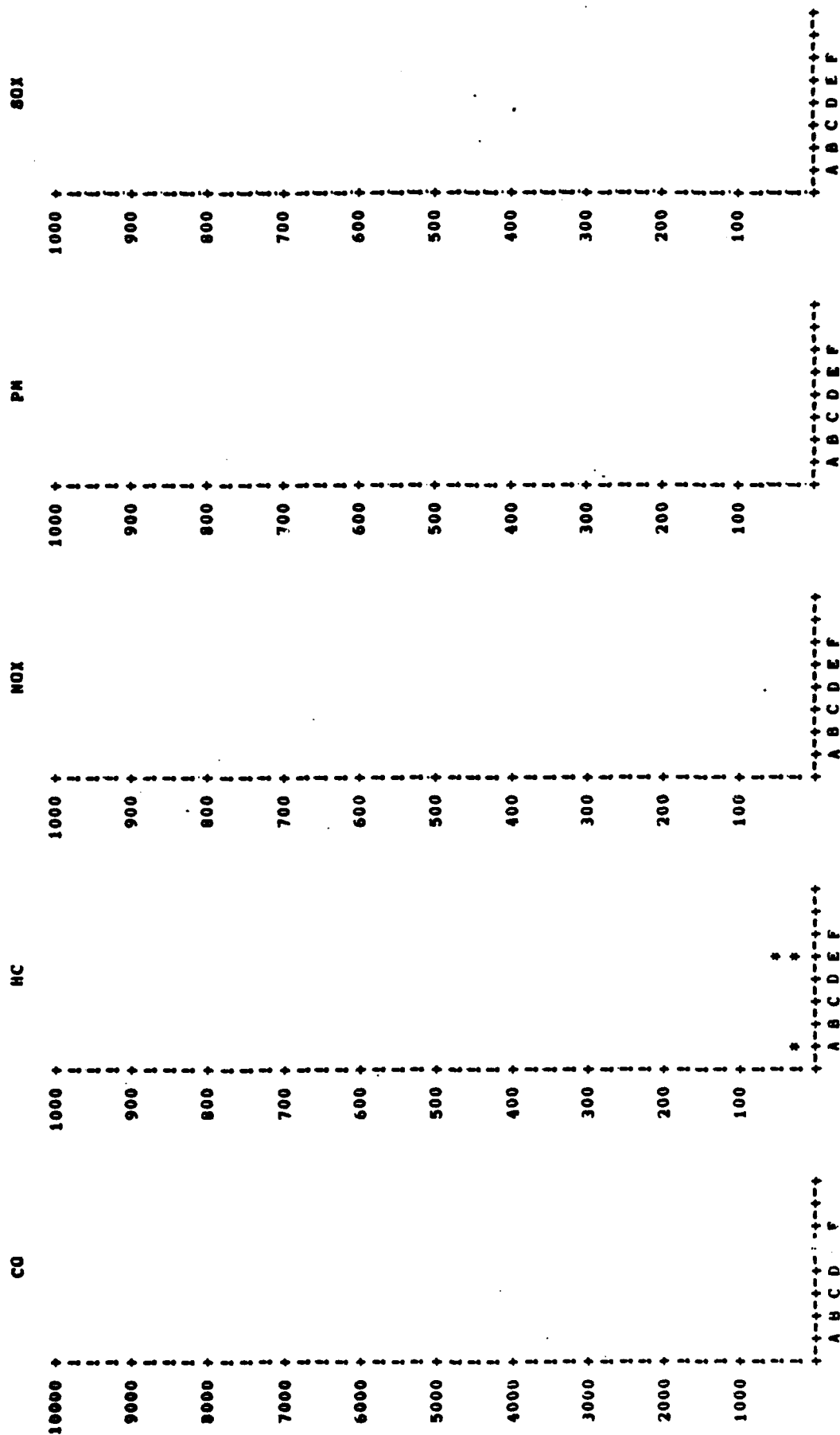
# SUMMARY OF ANNUAL EMISSIONS FROM EVAPORATIVE HYDROCARBONS

ALL LOSSES IN METRIC TONS						
	CO	HC	NOX	PM	SOX	
A. STORAGE TANKS	0.0	41.352	0.0	0.0	0.0	0.0
B. FILLING	0.0	0.0	0.0	0.0	0.0	0.0
C. PET STOR TKS	0.0	0.0	0.0	0.0	0.0	0.0
D. TANK TRUCK PK	0.0	0.0	0.0	0.0	0.0	0.0
E. VEH PARKING	0.0	70.266	0.0	0.0	0.0	0.0
F. OTHERS	0.0	0.0	0.0	0.0	0.0	0.0



# SUMMARY OF ANNUAL EMISSIONS FROM EVAPORATIVE HYDRO

## ALL LOSSES IN METRIC TONS



- A. STORAGE TANKS
- B. FILLING
- C. PET STOR TKS
- D. TANK TRUCK PK
- E. VEH PARKING
- F. OTHERS

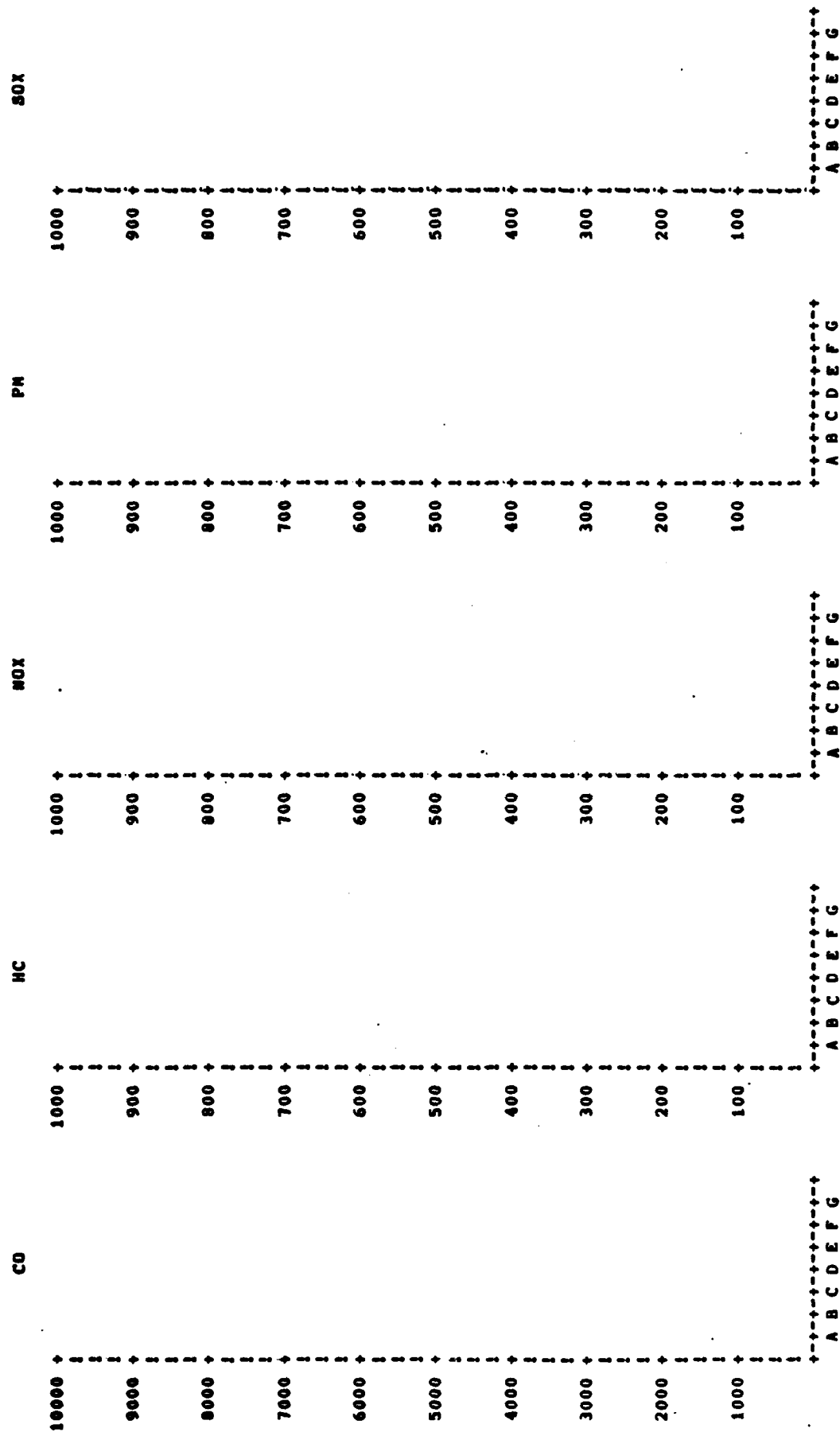
# SUMMARY OF ANNUAL EMISSIONS FROM ENVIRONS

## ALL POLLUTANTS IN METRIC TONS

	CO	HC	NOX	PM	SOX
A. ENVIRON PTS.	0.0	0.0	0.0	0.0	0.0
B. ENV STA AREA	0.0	0.0	0.0	0.0	0.0
C. ENV MOB AREA	0.0	0.0	0.0	0.0	0.0
D. ENV LAND USE	0.0	0.0	0.0	0.0	0.0
E. ENV COM AREA	0.0	0.0	0.0	0.0	0.0
F. ENV ROAD WAY	0.0	0.0	0.0	0.0	0.0
G. ENV NON-ROAD	0.0	0.0	0.0	0.0	0.0

# SUMMARY OF ANNUAL EMISSIONS FROM ENVIRONS

## ALL POLLUTANTS IN METRIC TONS



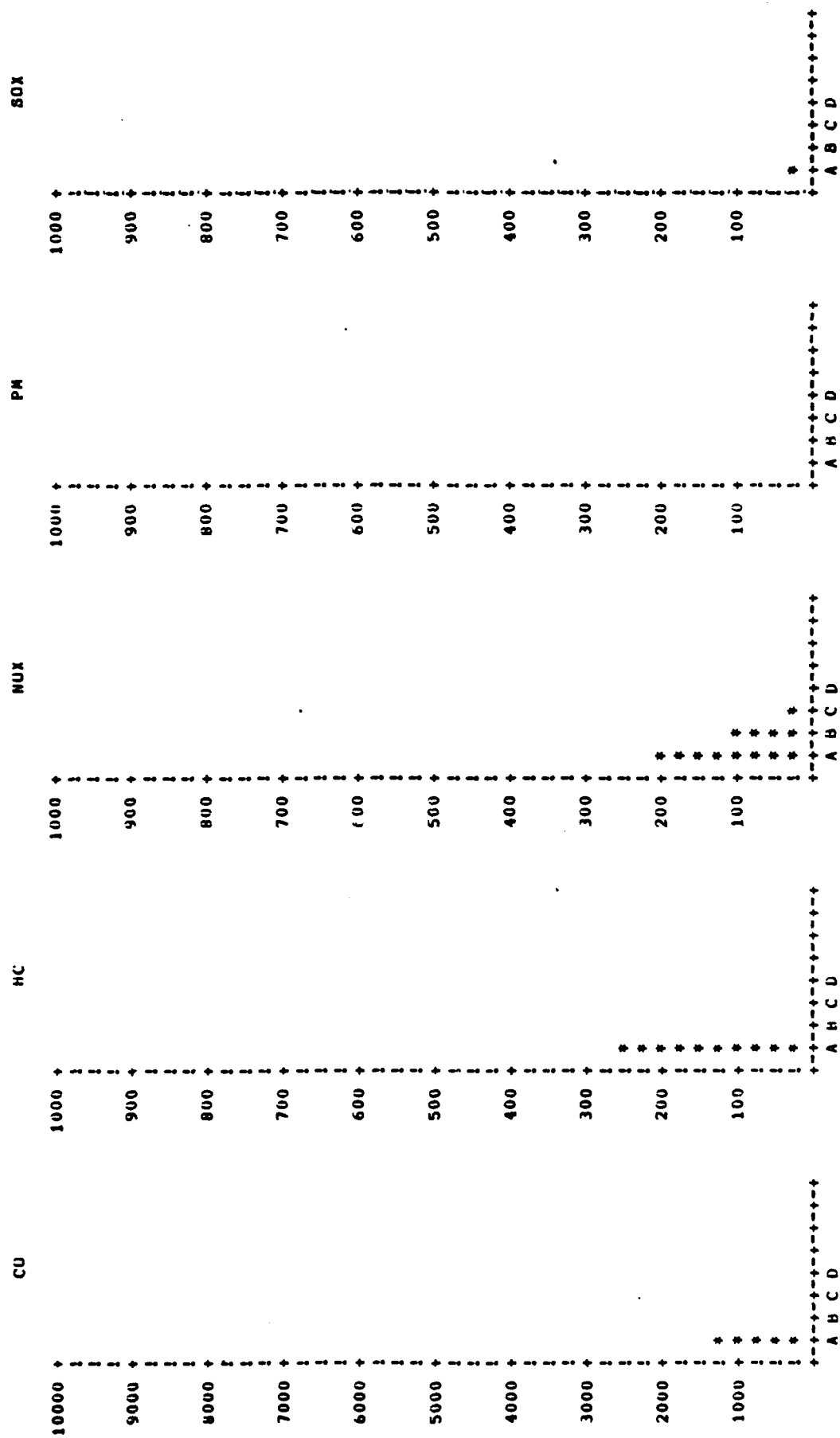
- ENVIRON PTS.  
A. ENV STA AREA  
B. ENV MOB AREA  
C. ENV LAND USE  
D. ENV COM AREA  
E. ENV ROAD WAY  
F. ENV NON-ROAD  
G.

# SUMMARY OF ALL ANNUAL EMISSIONS

## ALL POLLUTANTS IN METRIC TONS CU

A. AIRCRAFT	1250.643	267.282	215.697	24.208	40.192
B. GROUND MOBIL	171.118	22.938	114.157	6.632	4.419
C. FACILITIES	65.693	18.329	40.647	6.684	3.874
D. ENVIRONS	0.0	0.0	0.0	0.0	0.0

SUMMARY OF ALL ANNUAL EMISSIONS  
ALL POLLUTANTS IN METRIC TONS



A. AIRCRAFT  
B. GROUND MOBILE  
C. FACILITIES  
D. ENVIRONMENTS

## LIST OF ABBREVIATIONS AND SYMBOLS

AB	air base
AFB	Air Force Base
AGE	aerospace ground equipment
Ann	annual
AQAM	air quality assessment model
ARR & DEP SV	arrival and departure servicing
AV Gas	aviation gasoline
Bldg	building
Bomb Lft	bomb lift
BTU	British Thermal Units
CHP	central heating plant
Civ	civilian
Compresor	compressor
CO	carbon monoxide
Cub Met	cubic meter
Deg F	degrees Fahrenheit
Desl	diesel
Env	environ
Env Mob Area	environ mobile area
Env Non-Road	environ non-roadway line
Env Road Way	environ roadway line
Env Sta Area	environ stationary area
FAC	facility
Generator	generator
GSE	ground support equipment

HC	hydrocarbon
hr	hour
Jack Man	jacking manifolds
JP-4	jet petroleum fuel #4
Kilolit	kiloliter
Km	kilometer
Leak Tst	leak test stand
Light Std	light stand
Las	lines
LTO	landing and take-off
M Cu Met	million cubic meters
Met	meters
Mil	military
Mil BTU	million BTU
MoGas	motor vehicle gasoline
MPH	miles per hour
M-Tons	metric tons (2204.6 pounds)
NO <sub>x</sub>	oxides of nitrogen
Pet Stor Tks	petroleum storage tanks
PM	particulate matter
POL	Petroleum, Oil and Lubricants Section
Pts	points
SO <sub>x</sub>	sulfur oxides
Stds	stands
T/G	touch and go cycle
Tnk Truck Pk	petroleum tank truck parking area

Transent	transient
TSP	total suspended particulate
Tst Stand	test stand
USAF OEHL	USAF Occupational and Environmental Health Laboratory, Brooks AFB TX 78235
Veh	vehicle



10000  
9000  
8000  
7000  
6000  
5000  
4000  
3000  
2000  
1000

C-7

END

FILMED

1-84

DTIC